



TEXAS TECH UNIVERSITY

Department of Chemical Engineering™

Directed Assembly by Capillarity

Dr. Kathleen J. Stebe

Department of Chemical and Biomolecular Engineering

University of Pennsylvania, 220 S. 33 Street, Philadelphia, PA 19072

ABSTRACT

Particles with well defined shapes can be directed to assemble spontaneously into complex structures at fluid interfaces by capillarity. Here we explore two themes using experiment with supporting analysis and simulation. First, we explore the assembly of microparticles with well-defined shapes on otherwise planar interfaces to form microstructures with preferred orientations and mechanical responses that depend subtly on particle shape. Second, we study particles on curved interfaces. On curved interfaces, particle-induced deformations interact with interface curvature field. The resulting capillary energy forces particle migration along curvature gradients and drives particle alignment along principal axes. Curvature driven migration is explored as a means to direct particles to docking sites, and to mold particle structures.